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Causes of Coal Miner Absenteeism

By Robert H. Peters and Robert F. Randolph

UNITED STATES DEPARTMENT OF THE INTERIOR

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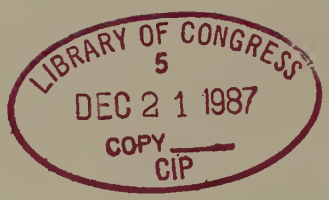
UNITED STATES DEPARTMENT OF THE INTERIOR
Donald Paul Hodel, Secretary

BUREAU OF MINES
David S. Brown, Acting Director



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CONTENTS

	Page
Abstract	1
Introduction	2
Review of literature on miners' absenteeism	3
Effects of miners' absenteeism	3
Effects of absenteeism on safety	4
Effects of absenteeism on productivity	4
Causes of miners' absenteeism	5
Research on causes of absenteeism among nonmining employees	7
Personal characteristics	7
Safety	9
Health	9
Unionization	10
Work-related attitudes	10
Job involvement	11
Distributive justice	12
Incentive programs	12
Economic and job market conditions	13
Attendance norms	13
A model of the causes of miners' absenteeism	14
Definition of variables	14
Relationships between variables	15
Perceived ability to attend	15
Attendance motivation	15
Overall job satisfaction	16
Job involvement	17
Distributive justice	18
Absence control system permissiveness	18
Desire to avoid loss of income	18
Attendance norms	19
Personal values	19
Methods of data collection	20
Sample	20
Interviews	21
Presentation of findings	21
Individual variables	21
Absenteeism	21
Perceived ability to attend	22
Transportation problems	25
Age and illness	26
Safety	26
Attendance motivation	26
Overall job satisfaction	26
Job involvement	27
Distributive justice	28
Absence control system permissiveness	28
Desire to avoid loss of income	28
Attendance norms	28
Personal values	29
Entire multivariate absenteeism model	29
Discussion	29
References	32
Appendix.--Interview guide for miners	36

ILLUSTRATION

Page

1. Absenteeism model..... 14

TABLES

1. Breakdown of mine employees by job title..... 20
2. Operational definitions of dependent (absenteeism) variables..... 22
3. Operational definitions of independent variables..... 23
4. Correlations of independent variables with absenteeism measures..... 25
5. Regression models of nine absenteeism variables..... 30

UNIT OF MEASURE ABBREVIATIONS USED IN THIS REPORT

°F	degree Fahrenheit	pct	percent
min	minute	yr	year

CAUSES OF COAL MINER ABSENTEEISM

By Robert H. Peters[1] and Robert F. Randolph[1]

ABSTRACT

This Bureau of Mines report describes several significant problems associated with absenteeism among underground coal miners. The vast empirical literature on employee absenteeism is reviewed, and a conceptual model of the factors that cause absenteeism among miners is presented. Portions of this model were empirically tested by performing correlational and multiple regression analyses on data collected from a group of 64 underground coal miners. The results of these tests are presented and discussed.

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INTRODUCTION

Although estimates of the rate of absenteeism in the mining industry vary, most sources suggest that it is high relative to the rate in other industries. Based on attendance data collected in May 1978 and May 1980, the U.S. Bureau of Labor Statistics reported that, among all U.S. nonfarming industries, mining was the highest in terms of the proportion of hours lost to absences (75, 78).[2] Taylor (75) notes, "The proportion of worker hours lost to absences in mining (5.1 pct) was substantially higher than the corresponding total for the goods-producing sector as a whole (3.5 pct)."[3] In 1976, Wilkinson (82) claimed, "no other U.S. industry has an absenteeism rate that compares with coal mining, which averages 12 pct." In 1980, Adkins (2) claimed, "the industry wide rate for U.S. underground coal mines has been running at 10 to 15 pct for the past several years. For certain problem shifts, notably midnight on weekends, rates as high as 20 to 30 pct are not uncommon."

An analysis of absence data presented by Goodman (21) reveals the following statistics concerning absence rates during 1982 at 11 relatively large underground coal mines with unionized labor: Total absenteeism across these 11 mines averaged 12.1 pct.[4] This total is composed of sanctioned absences (5.8 pct), nonsanctioned absences (2.2 pct), and absences due to sickness and injury (4.1 pct).

Given current high rates of unemployment in the mining industry, absence rates in the mid-1980's are probably not so high as they were in the preceding decade. The U.S. Bureau of Labor Statistics May 1985 survey (77) found that absenteeism in the mining industry was 3.6 pct. Although this rate is lower than the rates for mining reported in 1978 and 1980, mining was still substantially higher than the overall average (2.5 pct) for goods-producing industries in 1985. Although the problem is not so widespread today as it once was, it still exists and will continue to haunt the mining industry from time to time until mine managers learn better methods for controlling it. Absenteeism can be expensive. At the national level, Steers and Rhodes (73) estimated the cost of absenteeism in the United States for 1983 to be about $30 billion. Gandz and Mikalachki (18) estimated the annual costs of absenteeism in Canada to be about $8 billion.

A 1980 survey by the Bureau of National Affairs (10) suggests what absenteeism can cost a single company:

> A small southern manufacturer reported that for the year 1980, the total paid absences of a group of 310 hourly and nonexempt salaried employees cost the company approximately $76,500. Of this total, paid sick time was $64,000; paid funeral leave was $3,500; paid jury duty was $700; paid personal time was $8,300. 1980 unpaid absence amounted to $70,000 in manhours lost from work. A large southern manufacturer reported that one hour of absence is equivalent to 2 1/2 hours production cost increases. A small central manufacturer reported that to cover for absent employees, 20 extra employees are needed on the payroll at a cost of over $30,000 each.

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[2]Underlined numbers in parentheses refer to items in the list of references preceding the appendix.

[3]This rate was calculated as (number of hours absent/number of hours usually worked) × 100. However, absences resulting from vacations, holidays, industrial disputes, or weather conditions were excluded.

[4]This rate was calculated as (total days absent/number of days scheduled to work) × 100. Unlike the Bureau of Labor Statistics study, Goodman includes graduated vacation days in the numerator. He defines absences as any day when the mine was scheduled to operate, but the individual did not come to work.

A study by Moch and Fitzgibbons (53) suggests what absenteeism can cost a single department. They estimated that unanticipated absenteeism in one department of a medium-sized food packaging plant resulted in a loss of $60,075 annually in product wastage. The authors point out that the total costs of absenteeism at this plant are much greater than this figure because the plant has 29 other product lines, and because absenteeism results in several types of significant costs other than product wastage.

Although there appear to be no published estimates of the cost of absenteeism in the mining industry, one can safely assume that, based on the estimated rates of absenteeism, the costs are significant. In 1976, the labor relations vice president for one of the largest coal companies reported that his company was carrying an extra 5 pct of manpower to allow them to cope with absenteeism (82).

It is inevitable that members of underground coal mining crews will occasionally be absent. Sometimes the crew will work without a replacement, but usually someone is assigned to fill in for the missing miner. In either case, production and safety problems become more likely. Temporary replacements for regular crew members often are relatively unfamiliar with the habits of the people who work in the crew and with the physical conditions and equipment in the section.

Because they are unfamiliar with key aspects of their work environment, temporary replacements often either do things (or fail to do things) that can reduce productivity and contribute to accidents. This problem is especially important in underground coal mining because the work environment is very hazardous, and because the tasks performed by miners are very interdependent. The entire production process can be stopped if any one of several critical activities is not performed properly.

To keep attendance as high as possible, it is important to understand as much as possible about what causes miners to be absent. Understanding the primary causes of absenteeism is a prerequisite for deciding which of several strategies will be most effective for maintaining a high level of attendance. Therefore, the Bureau of Mines conducted the research study presented in this report primarily to learn more about the reasons for coal miners' absences. Based on prior studies of absenteeism (discussed in a later section), predictions were made concerning factors that might be likely to influence miners' rates of absenteeism. These predictions were empirically tested on a sample of 64 underground coal miners. Miners' absenteeism rates during a recent 12-month period were used as the criterion variable, and data on miners' demographic characteristics and attitudes about their work were used as predictors. The mine where this study took place is located in western Virginia. All individuals from whom data were obtained were nonsupervisory personnel who work underground.

REVIEW OF LITERATURE ON MINERS' ABSENTEEISM

The literature on miners' absenteeism can be divided into that which considers absenteeism to be the cause of other conditions or events, and that which considers absenteeism to be the consequence of other conditions or events.[5] This section discusses the literature pertaining to each of these two viewpoints.

EFFECTS OF MINERS' ABSENTEEISM

Most of the literature dealing with miners' absenteeism as a causal variable focuses on the effects that absenteeism has on mine safety and productivitry.

[5]Although it remains a distinct possibility, very few authors have viewed absenteeism as reciprocally related to other variables.

Effects of Absenteeism on Safety

The Theodore Barry report (76) notes that absenteeism leads to "short-crew" sections, with crew members forced into unfamiliar operations and tasks:

> In short-crew situations, section foremen often request that one or more crew members from the previous shift "double-back", i.e., work a second consecutive shift. Fatigue is the natural result of a 16-hour period of hard physical activity, and fatigue and accidents are highly correlated in any industrial activity.

Adkins (2) also refers to the negative effect of absenteeism on safety:

> Having to shift job assignments, work places and sometimes whole crews at the mine portal as the man trip is loaded is an obvious administration headache, devastating to crew and supervisor morale and detrimental to mine safety. Upon these consequences of absenteeism there is consensus.

Wilkinson (82) cites several mining company and union officials who have claimed that miners' absenteeism produces unsafe working conditions. The United Mine Workers has even tried sending union representatives out to the homes of poor attenders to discuss the importance of good attendance.

The first empirical study of the effects of miners' absenteeism on accident rates was performed by Goodman (21). Data were collected from a sample of miners at 19 underground coal mines. The data consisted of the mines' daily attendance records, accident records, and detailed interviews with approximately 50 miners from each mine. It was found that crews with poor job attendance consistently experience slightly more accidents than other crews. Goodman attributes the greater incidence of accidents in these crews to the tendency for replacement workers to be relatively unfamiliar with their temporary jobs.

Effects of Absenteeism on Productivity

It is generally acknowledged that absenteeism adversely affects a mine operation's productivity. However, as Adkins (2) points out, it is not necessarily easy to estimate accurately how much productivity would increase if absenteeism could be reduced by X pct. Adkins' main conclusion regarding the relationship between miners' absenteeism and productivity is that the relationship is complex and subject to the intervention or overriding influence of other variables:

> The relationship between productivity and absenteeism is mine specific and idiosyncratic. The reason the relationship is hard to determine is because, under any given set of physical constraints, productivity and absenteeism are both subject to other human performance elements that act independently of the physical environment. Absenteeism is only one of several "people problems" elements that impact productivity.

In describing the processes by which absenteeism influences productivity, Adkins notes,

> First of all absent workers simply don't produce much coal. In more indirect paths one can see that absenteeism can both increase safety problems and decrease the general skill level of the crews. Deteriorating skill levels lower production and increase maintenance and down-time problems. Absenteeism leads to labor/management relations problems, frequently arising from attempts to discipline absent workers, which in turn lowers the productivity of both labor and management.

Goodman and Leyden (23) provide empirical evidence concerning the effect of crew size on productivity. They analyzed data from 81 mining crews at 6 underground coal mines, using the number of tons of coal removed by a mining crew

during a shift as the criterion variable. After using multiple regression to statistically partial out the effects of other factors, crew size consistently emerged as a statistically significant variable in accounting for variations in the criterion variable. This strongly suggests that absenteeism that results in crews with fewer than the normal number of persons significantly reduces productivity.

An empirical study of various departments within a food processing plant by Moch and Fitzgibbons (53) revealed that absenteeism and work group efficiency are negatively associated only (1) when production processes are not highly automated, and (2) when the absences are not anticipated (and therefore cannot be planned for in advance). They argue that automation may significantly reduce the negative consequences of unanticipated absenteeism because it reduces the critical functions performed by employees to those that can be carried out by anyone with minimal ability and familiarity with the job. Because underground mining currently cannot be automated to the point that employees are more or less interchangeable, these findings suggest that when unanticipated absences occur and an experienced substitute cannot be found, the absence will lower the crew's level of productivity.

In conclusion, it appears that miners' absenteeism is generally considered to be important cause of accidents and low productivity. However, with the exception of Goodman (21) and Goodman and Leyden (23), there appears to be very little empirical evidence concerning these assumptions.

CAUSES OF MINERS' ABSENTEEISM

As was true about research on the consequences of miners' absenteeism, there appears to be considerable speculation about the causes of miners' absenteeism, but little empirical evidence other than that provided by Goodman (21). This section summarizes the literature on the causes of miners' absenteeism.

Adkins (2) identifies downtime as an important determinant of miners' absentee rates:

> Several miners said, in essence, that going to work was much more enjoyable when they felt they could produce coal and noted that if they got to the section to find it down their morale would fall and they would be more likely to consider "going out." This reaction is partly but not solely because they might have to do "dead work." Many felt even more discouraged when they faced a shift of doing nothing.

Adkins also suggests that job satisfaction is an important determinant of miners' attendance. He argues that miners' job satisfaction is largely determined by intrinsic and extrinsic rewards, job involvement (one's affective and intellectual ties to the job), peer relations, and supervisor-subordinate relations.

Although Adkins argues that good peer relations can lead to better attendance, he cautions that--

> Peer pressure to attend work does not, however, seem to be evident in the coal industry even though the additional hazard created by absence is generally recognized. There seems to be a countervailing group norm that recognizes a miner's right to "take a day off" now and then, totally at the individual's discretion.

Wilkinson (82) expresses a similar point of view about the relative ineffectiveness of peer pressure to attend. He quotes the vice president for administration at Island Creek Coal Co.:

> We used to be able to rely on the cohesiveness of the crew to keep down absenteeism, but because of job-posting, the crew structure isn't as strong as it used to be. There's no longer the question of letting the crew down.

Adkins argues that the primary determinants of good relations between supervisors and their crew are communication and trust:

> Of all complaints in industry, no single one is heard more than the complaint about lack of communication. The comments "no one ever tells me anything" or "no one ever listens to me" are all too common. This feeling of isolation and of an inability to receive or deliver information important to the satisfactory performance of one's job is a prime element of job dissatisfaction. The second component, trust, comes as a result of exercising honesty, fairness and respect in interpersonal dealings in the work place.

As has already been mentioned, job posting has been identified as an important contributor to miners' absenteeism. However, the Theodore Barry report (76) identifies a somewhat different process by which job posting leads to absenteeism. The report argues that eliminating posting would reduce the disproportionate number of new men on swing and midnight shifts and decrease absenteeism caused by the nondesirability of swing and midnight shift hours, particularly for younger men.

A labor relations manager for Peabody Coal Co.'s western mines has identified the mine's distance from various types of human services as an important determinant of absenteeism (82):

> In the case of some of the western mines, the sites are so remote that miners have to drive 150 miles to get to a bank, doctor, barber, etc. They take days off to do this.

Studies by Hedja, Smola, and Masek (29) and Goodman (21) both suggest that illnesses are an important cause of miners' absences. Hedja's group (29) has conducted a well-designed study on the effects of two types of interventions on the prevention of coal miners' illnesses. During the winter months of 1971-74, experimental groups of Czechoslovakian coal miners were given daily doses of vitamin C by their employer. Records were kept of the number of injuries and the number and duration of illnesses suffered by miners in control groups, who received no vitamin C, and in the experimental groups. In later stages of the study, one experimental group received influenza vaccinations in addition to the vitamin C.

A significantly lower proportion of miners had absence due to illness in the experimental groups than in the control groups, and the average duration of such absence in the experimental groups was markedly shorter. It was also observed that the incidence of illness in the group who received vaccinations and vitamin C was lower than the incidence of illnesses in the group who received vaccinations but did not receive vitamin C. It was also found that the incidence of injuries in the experimental groups was 45 pct lower than that observed in the control group.

In summary, there is some empirical evidence to support the claim that vitamin C and influenza vaccinations are effective in reducing miners' absenteeism.

As part of Goodman's (21) study of miners' absenteeism, miners were asked to indicate what causes them to miss work. The reason cited most frequently was illness. Although this methodology for determining the causes of miners' absences has some distinct limitations, the results of several studies conducted in other types of industries (using various research techniques) also strongly suggest that illnesses are a very important cause of absences. These studies are discussed in a later section.

Goodman's (22) empirical evaluation of the effects of an autonomous mining crew structure suggests that the degree to which miners are allowed to participate in decisions affecting their job is a significant determinant of absenteeism. (The primary effect of an autonomous crew structure is to increase miners' opportunity to participate in decisions affecting their job.) He found that, in comparison with control group crews (who kept the traditional pattern of centralized decision making), absenteeism was reduced to a significantly lower level in the autonomous mining crews.

Goodman's (21) more recent empirical study of coal miners' absenteeism reveals the following concerning the types of factors that appear to contribute to miners' absenteeism:

1. Illnesses and injuries are the most commonly cited causes of absence.
2. Off-the-job activities that miners need or want to do (e.g., family, hunting) are also commonly cited.
3. Negative job factors that might cause miners to avoid work are NOT frequently mentioned sources of absences.
4. Demographic factors such as age have a strong effect on attendance, but the nature of the effect differs from mine to mine.
5. Miners holding down another job are consistently absent more than their coworkers.
6. An organization's absence control policy and the degree to which that policy is consistently implemented within the workforce is a significant determinant of attendance.
7. Most miners do not feel highly pressured to produce--but those who do have higher absence rates.
8. Most miners report that they would rather have more time off than more money. This suggests that the desire for time away from work is one of the more important forces contributing to absenteeism.

In summary, the following is a list of the variables that have been cited in the literature as potential causes of miners' absenteeism:

Excessive downtime

Low job satisfaction or high dissatisfaction

Low extrinsic rewards

Low job involvement

Poor peer relations

Poor supervisor-subordinate relations

Job posting

Extreme distances between mine and essential human services

Illnesses

Centralized decision making

Desire or need to engage in off-the-job activities

Holding a second job

Inconsistent implementation of the absence control policy

Extremely high production pressures

High desire for time off relative to desire for money

RESEARCH ON CAUSES OF ABSENTEEISM AMONG NONMINING EMPLOYEES

Much research has been performed on the causes of employee absenteeism. This section attempts to characterize the findings from this body of literature in a concise manner. Only a few studies are described in detail. The main findings with regard to the following classes of causal variables are presented: personal characteristics, safety, health, unionization, work-related attitudes, job involvement, distributive justice, incentive programs, economic and job market factors, and attendance norms.

PERSONAL CHARACTERISTICS

Personal factors constitute a category of variables relating the characteristics of individuals to absence behavior. While numerous studies have been published, few consistent findings have emerged. In particular, absenteeism has been generally found to be positively related to family size (55), health problems (11, 41, 63), poor previous attendance (9, 38, 54, 83), and age (66).

A further influence on attendance is the personal value system of individuals (68). Some research suggests that a strong personal work ethic is closely related to attendance (17, 20, 35). Presumably, those individuals who feel morally obligated to work follow through in the form of actual attendance.

Hill and Trist (32-33) argue that some employees possess an "undealt-with unconscious hostility towards authority," and that this trait is responsible for a high rate of both absenteeism and job-related injuries. They reviewed the accident and absence records of a group of 289 men who joined the Park Gate Iron and Steel Co. Ltd. during 1947 and were still employed there after 4 yr. During this period 200 remained free of accidents, while 89 had sustained one or more.

These two groups, of 200 and of 89 men respectively, were then compared with regard to their total number of absences. The first hypothesis was that accidents may be used as a means of withdrawal from the work situation, and their occurrence therefore is likely to be influenced by the quality of the person's relationship with his employing authority. The withdrawal hypothesis was supported by the finding that those sustaining accidents incurred significantly more absences (due to reasons other than accidents) than those who had remained free of accidents.

A second hypothesis, the sanctioning hypothesis, states that accidents will tend to be most associated with the least sanctioned forms of absences and least associated with the most sanctioned forms. The authors state,

> This hypothesis links the sociological concept of legitimacy of social behavior to the psychological attitude of the individual towards authority--ultimately to his internal willingness to accept responsibility for himself. An accident is something for which an individual does not usually accept responsibility. Industrial accidents may therefore be expected to be related to other forms of absence where the individual does not accept responsibility for his behavior towards his employing authority, into which undealt-with unconscious hostility towards authority in his personality may be projected.

The two groups of 200 and 89 men were therefore also compared in terms of the following types of absences:

1. Leave with permission granted beforehand.
2. Leave where permission is not asked beforehand, but where the absence is ratified on return to work.
3. Certified sickness.
4. Uncertified sickness.
5. Unsanctioned absences.

A significant association was found between the incurring of accidents and unsanctioned absences (type 5). Also significant in their association with accidents were the retrospectively sanctioned absences (type 2-4), though in lesser degree. Prospectively sanctioned absences (type 1), on the other hand, were negatively associated: those who were able to accept most responsibility in taking matters up with the appropriate representative of their employing authority--those who got permission first--were those who tended most to avoid accidents. In summary, Hill and Trist provide some rather indirect, but provocative, empirical evidence to support the notion that absenteeism and accidents are caused by an employee's undealt-with unconscious hostility toward authority. However, not everyone agrees with this explanation. Like Hill and Trist (32), Verhaegen, Strubbe, Vonck and Abeele (79) also found a significant relationship between absence and accident rates. However, unlike Hill and Trist, they do not attribute the source of these absences and accidents to unconscious aspects of one's personality. They argue that both absenteeism and job-related accidents reflect an overall negative attitude that some employees have toward their employer--an attitude that these employees are quite conscious of.

An interesting area of concern with respect to personal factors is the topic of the personal value of nonwork activities.

Johns and Nicholson (36) discuss this subject at length, suggesting that some absence may be attributable to the value indivduals place on their "outside activities." For instance, Morgan and Herman (54) found that absence was related to anticipated achievement of off-the-job social outcomes and leisure time. On the basis of such findings, Johns and Nicholson (36) argue that "attendance patterns may reflect an attempt to balance the quantity and quality of time spent in various endeavors." Similarly, Youngblood (84) found that the value of leisure time was significantly related to total hours of absence. Youngblood concluded that "the results generally supported the view that absenteeism is a function of motivation processes extant in both the work and nonwork domains."

SAFETY

A commonly cited assumption is that absenteeism leads to more dangerous working conditions. However, Allen (3) suggests that the reverse is also true: Dangerous working conditions can cause high absenteeism, turnover, and other forms of withdrawal. He argues that not only do hazardous working conditions cause absences directly, i.e., through lost-time injuries, such conditions also cause high absenteeism indirectly--employees wish to avoid their workplace because it is perceived as a threat to their safety and health.

As part of his doctoral dissertation research at Harvard, Allen analyzed data from 1,022 employees interviewed for the 1972-73 Michigan Quality of Employment Survey (includes employees across several different industries and occupations). Multiple regression analyses of these data revealed that absenteeism incidence rates are negatively related to (1) the employee's marginal earnings, (2) the perceived degree of occupational safety at the job, and (3) the flexibility of the work schedule, i.e., absenteeism is significantly higher in jobs with low wages, high perceived risk of occupational illness or injury, and inflexible work schedules.

The self-evaluated danger variable coefficient was quite sizable and statistically significant ($p < 0.01$).[6] Allen's data suggest that workers who feel they are exposed to dangerous or unhealthy working conditions have a daily absence rate that is about two percentage points higher than the rate for other workers, i.e., about 50 pct higher than the average 4-pct rate. Leigh (46) replicated this finding using data from 747 employees interviewed for the 1973 Michigan Quality of Employment Survey, i.e., the self-evaluated danger variable was positively associated with absenteeism at a statistically significant level ($p < 0.05$). These results complement Viscusi's (80) finding that the quit rate is positively related to the risk of occupational illness or injury across establishments.[7]

HEALTH

Illness is widely recognized as the most important cause of absenteeism (26-28, 47, 60), accounting for from one-half to two-thirds of all employee absence (51). In Goodman's (21) study, almost all miners cited illnesses and injuries as the most common cause of their absences.

The recent literature on health locus of control beliefs has found that internals (those who believe that health is substantially under one's own control through proper health habits) displayed

---

[6]The symbol "p" represents the probability that no replicable effect exists given the observed data. Thus, if p is small, the measured effect is likely to represent a "real" and reproducible effect. Measured effects that are large enough to result in values of p less than 0.05 are commonly considered to be "statistically significant."

[7]Allen cautions that cost-benefit analyses of safety investments that do not consider the effects on absenteeism and turnover will underestimate the benefits.

more desirable self-care and provider care behaviors than did externals (those who believe that one's health is largely a function of luck or chance) (43, 81). Because of their better health habits, it can be expected that internals would be less likely to be sick than externals and hence to have lower absenteeism. This was one of several hypotheses recently tested on a sample 190 employees of a medium-sized communication equipment manufacturing and distribution plant (38). When 10 independent variables were examined for their ability to add unique variance to the prediction of absenteeism, only health locus of control, prior absenteeism, and group cohesiveness were found to be significant. In summary, there is some empirical evidence to support the claim that employees with an internal health locus of control have lower rates of absenteeism. As, the evidence is limited to a single study, future research should attempt to replicate this finding.

UNIONIZATION

Leigh (46) argues that through providing a monopoly (high) wage, unions discourage absenteeism because the opportunity costs of missing work are relatively high. On the other hand, unions tend to provide more generous sick leave benefits, which often reduce the opportunity cost of missing work to zero. Leigh empirically tested a model of the effects of unionization on absenteeism using data from the 1973 Michigan Quality of Employment Survey. The survey utilized a national probability sample of persons 16 yr old and older who were working for pay for 20 or more hours per week. The results of logit regressions, which provide statistical controls for human capital and demographic characteristics as well as working conditions, suggest that the net effect of unionization is to encourage absence among blue collar workers ($p < 0.05$), but not among white collar workers. Blue collar union members were absent roughly 2.6 pct more often than nonunion blue collar workers.

WORK-RELATED ATTITUDES

According to Steers and Rhodes (73), overall job satisfaction, job involvement, organizational commitment, and several dimensions of job satisfaction (work itself, supervision, coworkers, pay, and promotion) have received the greatest research attention among the work-related attitudes as predictors of absence. They have identified 31 studies on overall job satisfaction, 9 studies on job involvement, 8 studies on organizational commitment, 21 studies on satisfaction with work itself, 19 studies on satisfaction with supervision, 16 studies on coworker satisfaction, 18 studies on pay satisfaction, and 17 studies on promotion satisfaction.

Job satisfaction is the degree to which individuals like their jobs (72). Virtually all major reviews of the absenteeism literature have found consistently significant relationships between job dissatisfaction and absenteeism. However, the associations found in these largely bivariate studies have not been particularly strong (48) and have been generally limited to measures of overall job satisfaction (65) and satisfaction with work (55). Nicholson, Brown, and Chadwick-Jones (57) have provided a frequently cited illustration of the serious difficulties researchers have encountered in their attempts to demonstrate that the various facets of satisfaction are major determinants of absenteeism. Their study failed to identify a demonstrably strong relationship between a good facet measure of satisfaction (modified Job Description Index, 72) and multiple measures of absence, in a large sample of workers from 16 separate organizations. However, Nicholson's conclusion that "the common view of absence as a pain-reductive response on the part of the worker to his work experience is naive, narrow, and empirically unsupportable" appears to be an overstatement. An alternative explanation for their findings is that, characteristic of research in this area, other important determinants of absence behavior (such as the employee's ability to

attend) were omitted from their model. Herman (30) claims that work attitudes are important predictors of absences only when the absences are under the control of the employee--which is often not the case.

To test this argument, Smith (71) examined the relationship between the work attitudes and work attendance of two large groups of managerial employees on a specific day but at different locations--one where it had snowed the previous day and one where it had not. Since occasional absenteeism at the managerial level is not subject to financial penalty and is relatively free of social and work-group pressures, it represents behavior that is generally free of social and work-group pressures, i.e., it represents behavior that is generally under the control of the individual employee. Moreover, because the particular day investigated in this study followed "an unexpected and severe snowstorm that greatly hampered the city's transportation system" (71), employees had even more discretion over whether or not to attend. Absent employees probably expected that their superiors would understand that they had decided not to come to work due to the snowstorm, and would not fault them for being absent. The primary sample of 3,010 employees was located at Sears headquarters in Chicago. The control group was located at Sears' New York office. The results show significant relationships between six work-related attitudes and attendance on the specific day studied. The snowstorm attendance in Chicago is significantly correlated with all six attitude measures and, in the case of three scales, is highly (1-pct level) significant (supervision, financial rewards, and career future). In the New York sample, none of the correlations were significant. These results generally support Herman's (30) point of view that work attitudes do predict work-related behavior when such behavior is under the control of the employee.

These findings suggest two important things about using job satisfaction to predict absenteeism: (1) Employees' job satisfaction is important in understanding absences only in instances when the employee has some control over whether or not to attend, and (2) it is important to determine employees' satisfaction with specific aspects of their job, because certain work aspects are significantly more highly correlated with attendance than others.

McShane's (50) metaanalysis of the absenteeism-job satisfaction literature supports the assumption that employees who are dissatisfied with various aspects of their jobs are more likely to be absent. In particular, the relationship was strongest for overall satisfaction and work (job content) satisfaction. Moreover, in contrast to previous reviews (55, 74), satisfaction with coworkers, pay, and supervision was also related to reduced absenteeism. However, satisfaction with promotions was uncorrelated with absenteeism.

In summary, there appears to be a fairly consistent, modest, and inverse relationship between work-related attitudes and absenteeism.

JOB INVOLVEMENT

According to Kanungo (37) psychologists have defined job involvement in several different ways. Most definitions contain one or more of the following components: job involement is the extent to which (1) the employee's work is a central life interest, (2) the employee actively participates in his or her job, and/or (3) the employee perceives good job performance as central to his or her self-esteem and consistent with his or her self-concept. Bass (4) argues that involvement in one's job is determined by the presence of six conditions: opportunity for making job decisions, the feeling that one is making important contributions to organizational success, and experience of personal success, personal achievement, self-determination, and personal autonomy in matters of setting one's own work pace. Lawler and Hall's (45) notion of job involvement is that "the more the job is seen to allow the

holder to influence what goes on, to be creative, and to use his skills and abilities, the more involved he will be in the job." As one might expect, the available empirical evidence concerning the effects of job involvement on absenteeism suggests that highly involved workers exhibit significantly lower levels of absenteeism (6, 9, 13, 24, 61, 69).

DISTRIBUTIVE JUSTICE

Distributive justice is the degree to which rewards and punishments are related to performance inputs into the organization (34). This concept addresses the degree to which employees are rewarded fairly for their contributions and efforts on behalf of the organization. Several researchers have considered the perceived absence of distributive justice to be an important cause of employee absenteeism, e.g., Chadwick-Jones, Brown, and Nicholson, (12), Dittrich and Carrell (16), Gibson (19), Johns and Nicholson (36), March and Simon (49), and Patchen (61). However, this assumed relationship has been empirically tested by only a very small number of researchers, e.g., Dittrich and Carrell (16).

INCENTIVE PROGRAMS

Three general types of incentive programs have been used to reduce absenteeism: positive reinforcement programs, negative sanctions programs, and mixed programs that used both positive and negative incentives.

Positive reinforcement programs provide some reward for lower absenteeism. Steers and Rhodes' (73) review of research on these programs indicates that reinforcers such as bonuses, participation in a lottery, participation in a poker hand, food credit reimbursement for unused sick leave, and desirable work schedules can lead to a reduction in absenteeism. While there are other programs using positive reinforcement that did not lead to a reduction in absenteeism, the majority of the empirical evidence supports the effectiveness of positive reinforcement programs.

Programs based on negative sanctions are built around absentee control plans. Control plans usually specify stages, levels of absenteeism permitted, penalties, and continuous attendance necessary to work oneself off the absentee control plan. Basically these plans identify a series of stages of varying forms of punishment. For example, absenteeism at a particular level would lead to a warning letter. Subsequent levels of absenteeism would lead to a suspension. Continued absenteeism would lead to dismissal.

Despite the widespread use of management sanctions in business organizations (10), the evidence supporting their effectiveness in attendance control is limited largely to anecdotal case studies--very little empirical research of acceptable quality has been performed. For example, Seatter (70) discussed an attendance control program based on relatively strict disciplinary measures implemented over a 5-yr period. While Seatter reported a major (and sustained) reduction in absence rates during the time period, it was impossible to separate the program's effects from the multitude of exogenous variables that could have accounted for the improvement in attendance.

According to Steers and Rhodes (73) and Baum (5), the literature is characterized by divided opinions and conflicting findings concerning the efficacy of sanctions in reducing absenteeism. Much of the opposition to the use of sanctions is based on two grounds: (1) Behavior modification techniques based on positive reinforcement of desired behaviors (coming to work regularly) are more suitable and effective in dealing with absenteeism, and (2) sanctions based on the use of disciplinary procedures (punishments) tend to produce undesirable side effects that are as objectionable as the behavior of primary interest. For example, Nicholson (56) found that rigorously enforced sanctions caused workers to resort to longer, medically related absences to escape the consequences of the disciplinary system; the overall level of days lost was not changed by the "clamp-down." In contrast, a well-designed

empirical study by Baum (5) found that the strict enforcement of an absence control policy significantly reduced absenteeism without causing any discernible change in either long-term illnesses or contractual absences.

Several plans that include both positive incentives for attendance and negative sanctions for absence have been devised and empirically tested (25, 39-40, 42). These mixed-consequence plans were generally found to be quite effective at reducing absenteeism. The design of these mixed plans varied considerably. Those who wish to find out the details of each of these plans are referred to the four articles cited above.

ECONOMIC AND JOB MARKET CONDITIONS

Economic and job-market conditions often place constraints on employees' ability to change jobs. As a result, in times of high unemployment, there may be increased pressure to maintain a good attendance record for fear of losing one's job. Evidence suggests that there is a close inverse relationship between changes in unemployment levels within a given geographic region and subsequent absence rates (7-8, 14). Moreover, as the threat of layoff becomes even greater (for example, when an employee's own employer begins layoffs), there may be an even stronger decrease of absenteeism (8, 15). On the other hand, when an employee knows that he or she is to be laid off (as opposed to a knowledge that layoffs are taking place in general), the situation is somewhat different. Specifically, Owens (59) found that railway repair employees in a depressed industry who had been given notice of layoff because of shop closure had significantly higher absence rates prior to layoffs than a comparable group of employees who were not to be laid off. Owens suggests that, in addition to being a reflection of manifest anxiety, the increased absenteeism allowed employees time to find new positions. However, Hershey (31) found no significant differences in absence rates between employees who were scheduled for layoffs and employees not so scheduled. He argued that the subjects in his study were much in demand in the labor market and generally felt assured of finding suitable jobs. Steers and Rhodes (73) summarize the evidence concerning the influence of this set of factors as follows:

> When general economic conditions are deteriorating, absenteeism decreases for several reasons. First, employees with poor attendance records may be among the first to be laid off. Second, remaining employees may be less likely to be absent for fear of reprisal. However, when the individual employee is to be laid off, absence rates are apparently influenced by one's perceptions of his or her ability to find alternate employment. When such alternatives are readily available, no effect of impending layoff on absenteeism is noted; when such alternatives are not readily available, absence rates can be expected to increase as employees seek other employment.

ATTENDANCE NORMS

Although there has been very little empircal research on the influence that work-group norms have on absenteeism, several authors have suggested that such norms have an important effect; see, for example, Gibson (19) and Steers and Rhodes (74). Moreover, Lawler (44), in his job-attractiveness model of employee motivation, pointed out that members of highly cohesive groups often view coming to work to help one's coworkers as highly desirable. Johns and Nicholson (36) argue that "the net interactive effect of the normative forces that exist in the various relevant portions of employees' role sets" is of central importance in understanding absence behavior. In addition to his or her coworkers, the employee's attitudes about the appropriateness of absences are also probably influenced by the expectations of close friends and relatives.

A MODEL OF THE CAUSES OF MINERS' ABSENTEEISM

Using the findings from prior research on the absenteeism of miners and other types of employees, a conceptual model of the factors that produce absenteeism among miners was generated (fig. 1). Predictions regarding the direction of the association between the variables in the model are indicated by the symbols "+" or "−". The remainder of this section contains definitions for each of the variables and an explanation for each hypothesized relationship between variables.

DEFINITION OF VARIABLES

Total absences (absenteeism definition 1)--The total number of scheduled work days that the miner has failed to show up for work.

Frequency of absences (absenteeism definition 2)--The total number of absence events, where an absence event is defined as any set of consecutive days of absence. For example, three consecutive days of absences would constitute a single absence event.

Severity of absences (absenteeism definition 3)--The mean duration of the absence event. (Severity = total absences/total frequency.)

Attendance motivation--The degree to which miners intend or want to attend work.

Perceived ability to attend--The degree to which miners perceive themselves able to attend work.

Age--Number of years old.

Health status--The degree to which miners are free from illness and disease.

Job safety--The degree to which the miners' workplace is free of hazards.

Satisfaction with safety--The degree to which miners are satisfied with their personal safety while at work.

Satisfaction with coworkers--The degree to which miners view their coworkers as friendly and cooperative.

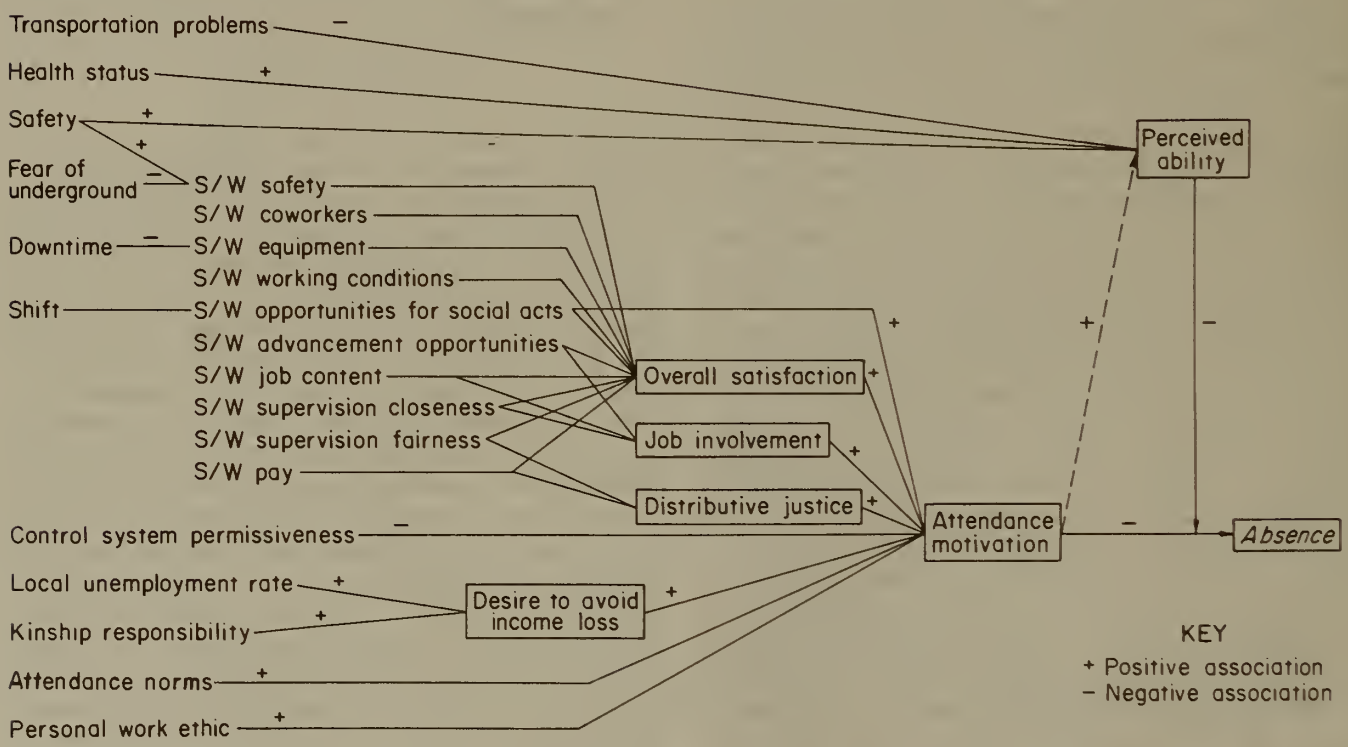

FIGURE 1.—Absenteeism model. (S/W = Satisfaction with. The hypothesized relation between the variables "Shift" and "Satisfaction with opportunities for social acts" is that miners who work daytime shifts are more satisfied with their opportunities for participating in social activities than those who work other shifts.)

Satisfaction with equipment--The degree to which miners are satisfied with the quality of the equipment they work with.

Satisfaction with working conditions--The degree to which miners like or dislike the physical aspects of their work environment.

Satisfaction with opportunities for family and social activity--The degree to which miners are satisfied with their opportunities to interact with their family and friends.

Satisfaction with career advancement opportunities--The degree to which miners are satisfied with the types of jobs they expect to have if they continue to work for their present employer.

Satisfaction with job content--The degree to which miners like their work.

Satisfaction with closeness of supervision--The degree to which miners perceive that their supervisor trusts them to do their work properly, allows them to set their own work pace, and gives them the freedom to choose how to do their job.

Satisfaction with fairness off supervision--The degree to which miners perceive that their supervisor allocates work assignments, resources, and various nonmonetary rewards and punishments in an equitable manner.

Satisfaction with pay--The degree to which miners are satisfied with the amount of money or equivalents distributed in return for service.

Overall job satisfaction--The degree to which miners like their jobs.

Job involvement--The degree to which miners perceive that their job allows them to influence what goes on, to be creative, and to use their skills and abilities.

Distributive justice--The degree to which miners perceive that the rewards (and punishments) they receive from their supervisor and employer are fair, given the level of their contributions to the organization.

Absenteeism control system permissiveness--The degree to which absenteeism is accepted by an organization, i.e., employees do not expect that frequent absences will be punished by adverse consequences.

Desire to avoid income loss--The miner's desire to avoid having his or her pay reduced (for unexcused absences).

Local job opportunities--The degree to which acceptable jobs with alternative employers are available.

Kinship responsibility--The extent of the miner's financial responsibilities for supporting dependents.

Attendance norms--The extent to which members of the miner's immediate work group, family, and friends view his or her absences negatively.

Personal work ethic--The degree to which miners feel morally obligated to attend work.

RELATIONSHIPS BETWEEN VARIABLES

Working backwards through the model, it is hypothesized that asenteeism is negatively associated with both attendance motivation and perceived ability to attend.

Perceived Ability To Attend

Miners' ability to attend is obviously an important factor in actual attendance. However, perceived ability may be more important than actual ability. That is, a snowstorm or a bad cold may or may not limit one's ability to come to work. What is important is how the individual treats the event and how he or she interprets its impact on ability to attend; for example, given equivalent transportation situations, some miners may report to work during a snowstorm while others may not. This is why the model contains a dotted line going from attendance motivation to perceived ability to attend. In addition to attendance motivation, other important determinants of perceived (and actual) ability to attend are transportation problems, illness, and injuries.

Attendance Motivation

The model identifies eight direct determinants of miners' attendance motivation: overall job satisfaction, including satisfaction with time for social activities; job involvement; distributive

justice; absence control system permissiveness; desire to avoid income loss; attendance norms; and personal values. Each of these is discussed below.

Overall Job Satisfaction

Although many researchers have found that job satisfaction is related to attendance, Goodman's (21) study suggests that job satisfaction may not be an especially good predictor of coal miners' attendance. The relationship between these two variables should be further investigated. Therefore, it is hypothesized that job satisfaction is positively related to miners' attendance motivation. For practical as well as theoretical reasons, it would be valuable to know which specific facets of job satisfaction are most strongly related to absenteeism. Therefore, the following variables are also included:

Satisfaction With Safety

The psychological fears associated with underground mining are an important consideration. The possibility of death or severe harm from falling rock, entrapment, explosions, and inundation is likely to detract from underground miners' desire to attend work. In addition to variations between miners in terms of the magnitude of their inherent fears about working underground, another important determinant of the degree to which miners are satisfied with their safety is the degree to which the workplace is perceived to be free of hazards. Owing to the hazards associated with mining, safety satisfaction is probably a more important predictor of overall job satisfaction for the mining industry than it is for most other industries.

Satisfaction With Coworkers

The work involved in underground mining is generally performed by small crews of approximately 10 or fewer people. These crews are physically isolated from one another. It is important that miners develop good relations with their coworkers because the work demands much coordination between crew members. This variable is considered a more important predictor of overall job satisfaction for miners than for employees in other industries.

Satisfaction With Equipment

Adkins has identified downtime as an important source of miners' dissatisfaction with work. He argues that miners become discouraged when frequent equipment problems force them to be idle for extended periods or cause them to perform "deadwork." This variable is probably a more important predictor of overall job satisfaction for miners than it is for employees in other industries. The uncomfortable nature of the underground environment makes it difficult for miners to find pleasant ways to pass extended periods of idle time. The amount of downtime is probably determined by the age and quality of the equipment and the amount of preventive maintenance performed.

Satisfaction With Opportunities for Family and Social Activities

A significant portion of the time most underground coal miners spend at work is during evening and night shifts. Because miners who work these shifts may have limited opportunities to do things with their family and friends, they may be especially likely to be absent from time to time so that they can take part in such activities. The rotating shifts used by some mining companies can also be disruptive to a miner's social life. Therefore, it is hypothesized that those who work nondaytime or rotating shifts (1) have lower levels of overall job satisfaction and (2) have lower levels of motivation to attend work. This is similar to experience in other industries with evening and night shifts.

Figure 1 shows a line leading directly from the variable Satisfaction with opportunities for social acts to the variable Attendance motivation. This is because, unlike the other "job satisfaction" variables, miners' Satisfaction with opportunities for social activities

is thought to influence Attendance motivation directly as well as indirectly, through its impact on Overall satisfaction. This variable is hypothesized to have a more direct influence on miners' attendance motivation than the other variables listed as determinants of miners' overall job satisfaction.

Satisfaction With Conditions of Work

The physical environment creates several types of discomfort for those who work underground. Conditions typically found in underground coal mines include darkness, high levels of noise and dust, dampness, temperatures of about 50° F, and ceilings that are not high enough for employees to walk or stand in an upright position. While underground, miners usually do not have access to clean water, toilets, or many of the other "necessities" that employees in other industries take for granted. In addition to the physical discomforts caused by the underground environment, some miners also experience psychological discomfort due to feelings of being "closed in" and isolated from the world outside. These conditions suggest that physical aspects of the work environment may be an important source of overall job dissatisfaction for miners.

Satisfaction With Job Content

Jobs in underground mining vary in terms of the degree to which miners derive satisfaction from performing them. Some jobs are more challenging, more interesting, more dangerous, less repetitive, more free from supervision, or less physically demanding than others. Some require fewer skills and are perceived as less important than others. Miners' satisfaction or dissatisfaction with their job classification is determined by both the characteristics of the work and the characteristics of the individual. Satisfaction with job content reflects the degree to which the characteristics of a miner's work are congruent with the miner's interests, desires, and capabilities. Prior research suggests that this variable is significantly related to both absenteeism and turnover (52).

Satisfaction With Supervision

Two important elements of miners' job satisfaction are the degree to which they are free from close supervision and the degree to which they perceive that their supervisor treats them fairly. Goodman (22) has noted that miners exhibit strong preferences for behaving autonomously:

> Mining throughout the years has been a very autonomous activity and very likely the nature of the work has reinforced the miners' personal preference for work that is relatively free from close supervision.

Given the apparent importance of this variable to coal miners, it is hypothesized to be a significant determinant of overall job satisfaction.

For obvious reasons, it is expected that miners who do not feel that their supervisor treats them fairly will have lower levels of overall job satisfaction. Adkins (2) also cites fair treatment as an important determinant of miners' absenteeism.

Satisfaction With Career Advancement Opportunities

Promotion among underground miners usually implies moving into another nonmanagerial job that is somewhat higher paying and likely to be less physically demanding and perhaps more intrinsically satisfying (i.e., the work is perceived as more important and more interesting). It is hypothesized that miners' overall job satisfaction is heavily influenced by the degree to which they are satisfied that they can realize their career goals by staying with their present employer.

Job Involvement

Job involvement has been found to be positively related to attendance. According to most definitions, the key

determinants of job involvement are aspects of job content, supervision, and career advancement opportunities. To the extent that the job involves work that allows the miner to feel that he or she is making important contributions to the organization, to experience a sense of personal achievement, and to make use of his or her skills and abilities, the miner will be involved in his or her job. To the extent that miners are supervised in such a way that they are typically allowed to influence what goes on at their work site, set their own work pace, actively participate in decisions about their work, and use creativity in solving problems, they will be involved in their jobs. To the extent that miners perceive that their career advancement opportunities with their current employer are good (i.e., that they are sufficiently competent and successful to be given the opportunity to perform more important and more difficult jobs in the future), miners will be involved in their current jobs. Therefore, it is hypothesized that (1) miners' satisfaction with job content, freedom from close supervision, and career advancement opportunities are all positively related to their job involvement and (2) the greater the miners' job involvement, the greater is their motivation to attend work.

Distributive Justice

Equity theory, as originally proposed by Adams (1), considers employees' perceptions of fair treatment by their employer to be a major determinant of their motivation to make contributions of time, energy, ingenuity, etc., to their job. The theory holds that one way employees may respond to actual or perceived unfair treatment is to reduce their job contributions. One obvious way to accomplish this reduction is to attend work less often (assuming that no loss of pay results). Therefore, it is hypothesized that a significant determinant of miners' attendance motivation is the extent to which they perceive that they are treated fairly by their employer, i.e., the degree to which distributive justice is perceived to exist in the employee-employer exchange.[8]

One important determinant of distributive justice is miners' perceptions about the adequacy of their wages, benefits and other economic rewards their employer provides. Another important determinant is the degree to which miners perceive that their supervisor allocates work assignments, resources, and various nonmonetary rewards and punishments in an equitable manner. Therefore, it is hypothesized that miners' perceptions of distributive justice are determined by their satisfaction with their economic rewards and the degree to which they perceive that their supervisor treats them fairly.

Absence Control System Permissiveness

Absence control systems involve those policies and procedures used by the organization to encourage attendance; permissiveness in this context is the degree to which absenteeism is accepted by the organization. An organization or subunit in which numerous casual absences result in few or no apparent adverse consequences would be highly permissive toward absenteeism. Empirical support for the hypothesized direct causal relationship between permissiveness and absenteeism has been reported by Seatter (70), Rhodes and Steers (67), Winkler (83), and Popp and Belohlav (64). Therefore, it is hypothesized that a high degree of permissiveness of the mine's control system is positively associated with absenteeism.

Desire to Avoid Loss of Income

Miners differ in the extent to which they desire to avoid losing income. The strength of this desire is hypothesized

[8]For a more extensive discussion of the employee-employer exchange and its implications for employee motivation, see Pearce and Peters (62).

to be positively related to their attendance motivation. Two determinants of miners' desire to avoid income loss are the local unemployment rate and kinship responsibilities.

Local Unemployment Rate

Economic and job-market conditions often place constraints on employees' ability to change jobs. As a result, in times of high unemployment, there may be increased pressure to maintain a good attendance record for fear of losing one's job. As previously discussed, several studies have found an inverse relationship between changes in unemployment levels within a given geographical region and subsequent absence rates. Therefore, it is hypothesized that local unemployment rates are positively related to miners' desire to avoid income loss and to attendance motivation.

Kinship Responsibility

Another determinant of miners' desire to avoid income loss is the degree to which they are responsible for supporting family members or other dependents. In contrast to single miners with fewer financial responsibilities, miners who must support a family are probably less willing to take the chance of losing some of their pay (or getting fired) because they take off work for reasons the company considers unexcusable. Therefore, it is hypothesized that kinship responsibility is positively related to miners' desire to avoid income loss, and to attendance motivation.

Attendance Norms

As previously mentioned, prior research suggests that another important determinant of attendance motivation is the degree to which the immediate work group views one's absences from work negatively. Therefore, it is hypothesized that miners' attendance motivation is positively related to the degree to which their crew views absences among its members negatively.[9] Although it has not been formally tested, it would also seem likely that a miner's attendance motivation is significantly affected by the norms of the miner's family, relatives, and close friends regarding the importance of job attendance.

Personal Values

Finally, the miner's personal value system may be an important determinant of job attendance. As previously mentioned, prior research suggests that a strong personal work ethic is closely related to attendance. Therefore, it is hypothesized that miners' attendance motivation is positively related to the degree to which they have a strong personal work ethic.

It is also important to consider personal values concerning nonwork activities. Some absence may be attributable to the value miners place on their nonwork activities. In his study of the Rushton Mine, Goodman (22) found that, although they view their work as important, miners usually did not feel that their job was the central part of their life; home and other nonwork activities were more central. This observation suggests that the values miners place on nonwork interests (e.g., hunting, hobbies, family activities) may be an important reason for some of their absences.

This section has presented a conceptual model of the causes of coal miners' absenteeism. Although a large number of variables have been included in the model, not every factor that can influence absences has been discussed. Rather, the variables included are intended to implicitly reflect the influence of the unnamed variables. For instance, miners' experience has been

[9]However, for various reasons it has been argued that the amount of peer group pressure on miners to attend work is minimal (2, 76, 82).

frequently hypothesized to be important in determining absences. The current model implicitly includes the important aspects of experience in several explicitly defined variables. Miners with more experience are less likely to be absent. However, the reasons for their lower absence rates probably stem primarily from two factors already included in the model, shift assignment and kinship responsibility. Miners with more experience are apt (1) to be more likely to work day shifts (which, as the model indicates, means that they will have more opportunities to participate in social activities than those who work other shifts) and (2) to be older and have greater kinship responsibilities (which, as the model indicates, means that their desire to avoid income loss will be greater than for younger miners with fewer financial responsibilities). The next step in this study was to collect data that could be used to begin assessing the degree to which the model actually accounts for variations in coal miners' rates of absence. Only by collecting and analyzing data on the actual behavior of coal miners can one begin to realize the model's limitations and see how it can be improved.

METHODS OF DATA COLLECTION

SAMPLE

Absenteeism data were collected for a 12-month period beginning July 1985 for 103 coal mine employees. These employees represent 95 pct of the nonsupervisory personnel who work underground at the mine where this study was conducted. This mine has been in operation for about 20 yr. It is one of several mines in the area that are owned by a large mining company. The coal from this mine is used to supply a major electric power company in a nearby State.

The mine operates three nonrotating shifts. The day and evening shifts are devoted to producing coal, and the night shift is devoted to maintenance activities. A layoff occurred at this mine shortly before the study began. Consequently, all the miners in this study had been working for their current employer for at least 13 yr. However, given that widespread layoffs in the coal industry occurred during the mid-1980s, this mine's older workforce is presently typical of many mines in the industry.

Coal was being extracted using the advancing room and pillar method and continuous mining machinery. The mine's employees were covered by the current United Mine Workers of America contract. This contract specified that miners are allowed 4 floating days, 5 personal or sick days, and 11 holidays in addition to their graduated vacation days. The company's policy was to pay employees for any of these contract days that they did not take, and to give letters of commendation to those with good attendance records at the end of each year. Although unexcused absences occurred now and then, neither management nor labor perceived absenteeism to be a significant problem at this mine. Table 1 breaks

TABLE 1. - Breakdown of mine employees by job title

Job title	Number of miners
Belt operator	10
Brattice worker	2
Electrician	10
Face worker	2
Fireboss	2
General inside laborer	3
Miner helper	4
Miner operator	4
Motor operator	4
Reset worker	1
Roof bolter operator	12
Shuttle car operator	8
Track worker	2
Total	64

down the total sample of mine employees by job title. The average miner was 44 yr old, had worked as a miner for 20 yr, was responsible for three dependents, and lived 21 miles from work. All persons in this sample worked underground on a full-time basis. The sample did not include cleaning plant personnel or any other type of employee who worked aboveground.

INTERVIEWS

Interviews were conducted underground, somewhere near the miners' worksites. All interviews were conducted in private. Miners were assured that their responses would be held in strict confidence and were told that their participation was completely voluntary. Interviews required approximately 25 min to complete.

Data were collected with a structured interview guide. (See appendix.) Interviewers asked questions concerning the following issues: (1) satisfaction with various job aspects, (2) details about one's most recent absence, (3) activities miners engage in when they are absent from work, and (4) several other details including age, martial status, number of dependents, and number of miles the miner must drive to get to the mine.

PRESENTATION OF FINDINGS

The relationships of individual variables will be discussed first, followed by the test of the entire hypothesized absenteeism model.

INDIVIDUAL VARIABLES

The overall rate of absenteeism among the sample of miners studied was 17 pct. This was computed as follows:

$$\text{Total absence rate} = \frac{\text{total days absent}}{\text{number of days scheduled to work}}$$

Total days absent includes all types of recorded absences, everything from contract days to unexcused days. Number of days scheduled refers to the number of days the mine was scheduled to operate--this does not include the holidays and vacation days during which the mine was not scheduled to operate. The overall rate of absences (17 pct) includes 12 pct that were due to illnesses and injuries, 5 pct that were days allowed by the contract (e.g., graduated vacation days), and a small fraction of a percent that were considered unexcused absences.

For the purposes of statistical analysis, the variables discussed in the previous sections were operationally defined[10] in terms of items in the data collection instruments. (See appendix.) These definitions are discussed below:

Absenteeism

A total of nine variables were constructed to characterize different types of attendance behavior. Following the categories used by Goodman (21), absences were characterized as either voluntary, semivoluntary, or involuntary:

1. Voluntary absence, V - These were absences characterized as discretionary, or contract days, or discretionary holidays, graduated vacation days, and miscellaneous paid absences.
2. Semivoluntary absence, SV - These were excused unpaid absences, and unexcused absences (AWOL's). While these may reflect some volition, they clearly are more costly to the individual and less desirable. This is a fuzzy category,

[10]An operational definition is one that specifies the meaning of the concept by denoting the measuring operations. Operational definitions specify the measuring operations used to identify phenomena, e.g., defining intelligence as one's score on an IQ test.

but seems intuitively distinct from category 1.

3. Involuntary absence, IV - These were absences categorized as on-the-job injuries, illnesses, and off-the-job injuries. There may be some argument here, particularly as to illness. Some authors have argued for short-term illness as often attitudinal in origin and possibly less costly than an AWOL absence. There is not sufficient information from the mine as to the validity of these concerns. To the extent this category does not generate shorter spells of absence, this may be a real threat. However, such an absence is still more costly than a voluntary absence, so that contrast of this category to the voluntary category should still be testable.

The mining company's coding system was used to assign miners' absences to Goodman's three categories. The mapping between the mine's categories and Goodman's is shown in table 2. The operational definitions of the dependent variables are described in table 3.

For each of these three types of absences, three summary indices were computed to characterize miners' absence behavior over the entire year of data collection. The conceptual meaning and method of calculating the indices (total, frequency, and severity of absences) was described earlier. A few of the miners were not employed during the entire year, so the indices were normalized by the total number of days each miner could have come to work. Hence, a miner who worked only half of the year and was absent one-tenth of the year would receive a total absences index of 0.05 (0.5 × 0.1). The frequency index was likewise normalized, and the severity index was intrinsically normalized because it is derived by dividing the total index by the frequency index.

TABLE 2. - Operational definitions of dependent (absenteeism) variables

Category	Company's code
Voluntary (V).....	Authorized.
	Floating vacation.
	Graduated vacation.
	Personal day (paid).
	Refused work.
Semivoluntary (SV).	Leave of absence.
	Suspended.
	Unauthorized.
	Unexplained.
Involuntary (IV)...	Bereavement.
	Jury duty.
	Military leave.
	No work available.
	Non occupational illness.
	Non occupational injury.
	Occupational illness.
	Occupational injury.
	Strike.

The interdependent nature of these three indices calls for special considerations when interpreting the findings. Since any one of the indices is mathematically determined by the other two, the indices should be considered as a set rather than individually. For instance, a high total index may correspond to high severity (a few long absences), to high frequency (many short absences), or to intermediate values of both severity and frequency. The highest severity score was for a miner who had one absence incident that lasted the entire duration of the study, resulting in a severity score of 242, a total of 242, and a frequency of 1/242. Conversely, the highest attainable frequency index would be approximately 0.5, indicating a miner who was absent every other day. In practice, the maximum frequency ranged from 0.07 (involuntary frequency) to 0.10 (voluntary frequency).

The impact of individual variables was assessed using Pearson correlations for interval scale variables and one-way analyses of variance for nominal variables. The correlations are shown in table 4.

Perceived Ability To Attend

Miners' perceived ability to attend work was not directly assessed. Rather, its precursors, transportation problems, age and illness, and safety, were used in predicting actual attendance.

TABLE 3. - Operational definitions of independent variables

Variable name	Operational definition
Total absences	Number of absences/number of days employed.
Frequency of absences	Number of absence incidents/number of days employed.
Severity of absences	Number of absences/number of absence incidents.
Attendance motivation	Not measured.
Perceived ability to attend	Not measured.
Health status	Miner's age, used as surrogate. Computed from birthdate from mine records based on date of interview.
Job safety	Miner's section used as surrogate.
Satisfaction with safety	Interview: "How satisfied or dissatisfied are you with the safety of working at this mine?"
Satisfaction with coworkers	Interview: "How satisfied or dissatisfied are you with the other members of your crew?"
Satisfaction with equipment	Interview: "How satisfied or dissatisfied are you with the quality of the equipment you work with?"
Satisfaction with working conditions.	Interview: "How satisfied or dissatisfied are you with the bath house, parking area, and other facilities above ground [and] the physical conditions below ground (e.g., top and bottom, water, eating areas)?"
Satisfaction with opportunities for family and social activity.	Interview: "How satisfied or dissatisfied are you with the amount of time you have to spend with your family and friends?"
Satisfaction with career advancement opportunities.	Interview: "Is there some other job at this mine that you would rather have than your present one [and] if yes, how satisfied are you with your chances of getting that job during the next 6-12 months?"
Satisfaction with job content	Interview: "How satisfied or dissatisfied are you with your work as a _____ (regular job)?"
Satisfaction with closeness of supervision.	Interview: "How satisfied or dissatisfied are you with your present boss?"

TABLE 3. - Operational definitions of independent variables--Continued

Variable name	Operational definition
Satisfaction with fairness of supervision.	Interview: "How satisfied or dissatisfied are you with your present boss?"
Satisfaction with pay.....	Interview: "How satisfied or dissatisfied are you with the amount of pay you get?"
Overall job satisfaction.....	Interview: "Overall, putting everything we've talked about together, how satisfied are you working here?"
Job involvement.....	Not measured.
Distributive justice.....	Interview: "How fair do you think the company is when they decide whether an absence is excused or not excused?"
Absenteeism control system permissiveness.	Interview: Leniency variable based on responses to four hypothetical absence questions.
Desire to avoid income loss.....	Interview: "Some people say they need 5 days' pay a week in order to get by. Some need 5 days plus overtime. Others claim they could make it on 3 or 4 days' pay. Do you need 5 days [or] 5 days plus overtime [or] could you make it on 3 or 4 days?"
Local job opportunities.....	Interview: "If you had to find another job (perhaps because of a layoff) how long do you think it would take?"
Kinship responsibility.....	"How many people (not including yourself) are dependent on you for support?"
Personal work ethic.....	Not measured.
Attendance norms.....	"If you were absent more days than the contract allows, how likely is it that you would be criticized by your family; be criticized by your crew; be criticized by your boss?"
Transportation problems.....	"About how many miles is it from your home to the mine?"

TABLE 4. - Correlations of independent variables with absenteeism measures

Independent variables	Totals			Frequency			Severity		
	V	SV	IV	V	SV	IV	V	SV	IV
Age	-0.07	-0.13	[2]0.29	-0.08	-0.14	-0.07	0.05	-0.14	[2]0.26
Control system permissiveness	-.06	.19	-.16	-.01	.17	[1]-.24	-.07	.05	-.04
Distance to mine	.07	.14	.02	.08	.14	.07	.03	.15	-.11
Management fairness	.03	-.06	-.01	-.05	.03	[2].35	.20	.12	-.06
Kinship responsibility	.01	.09	-.09	-.02	.07	.06	.04	.11	-.14
Local job opportunities	[2]-.42	-.08	-.23	[1]-.39	-.07	-.20	.08	-.11	-.16
Attendance norms:									
Crew	-.02	.21	-.16	.03	.18	-.01	.02	.05	-.11
Family	-.18	-.15	-.04	-.15	-.16	[1]-.24	-.07	[1]-.26	.00
Satisfaction with--									
Advancement opportunities	.10	-.03	[1]-.29	.02	-.10	[1]-.22	-.18	[1]-.24	-.13
Coworkers	-.10	.05	-.02	-.05	.03	-.07	.05	.18	-.02
Equipment	-.11	-.21	.03	-.07	[1]-.22	.09	.07	-.09	.05
Fringe benefits	-.09	-.07	.03	-.10	-.11	[1]-.22	.04	-.15	.05
Job content	.02	-.07	.00	-.04	-.07	.06	.07	-.08	.00
Opportunities for social activities	.10	-.11	.12	.07	-.14	-.17	-.04	[1]-.24	.13
Pay	.13	-.00	-.18	.13	-.01	.09	.02	.02	-.20
Safety	[1]-.25	-.05	.08	-.20	-.07	-.05	.15	-.19	.08
Supervision	.14	-.01	.04	[1].22	-.00	.06	[2]-.32	.08	-.00
Working conditions:									
Above ground	-.15	[1]-.22	-.09	-.14	[1]-.23	.01	-.07	[1]-.21	.00
Underground	[1]-.26	[1]-.28	.08	-.21	[2]-.30	.13	-.10	-.10	.07
Overall satisfaction	[1]-.23	-.12	-.15	-.19	-.16	[2]-.37	.07	-.03	-.07
Section dummy variable:									
1	.00	-.14	.02	.05	-.14	.00	.21	[1]-.22	-.06
2	-.10	-.09	.07	-.05	-.07	-.04	-.14	-.07	.19
3	.10	[1].23	-.08	.10	.21	.03	-.07	[1].29	-.12

V Voluntary absence. SV Semivoluntary absence. IV Involuntary absence.
[1]$p < 0.05$. [2]$p < 0.01$.

Transportation Problems

This variable was operationalized in terms of the distance miners reported they had to drive to work. This operationalization was based on the reasoning that weather and car problems would be more likely to impede miners who had greater commuting distances. Although there was considerable variation in this variable (ranging from 4 to 107 miles with a mean of 21 miles), it did not directly correlate with any of the nine absenteeism variables. As an alternative operationalization, ZIP Codes for miners' home addresses were obtained from the mine records. We used the ZIP Codes as a surrogate variable to represent variations in accessibility between different areas. For instance, an area may be relatively close to the mine but have poor access roads that are occasionally impassible. Using ZIP Code as a categorical variable, a one-way analysis of variance was performed to determine if attendance differed significantly from one area to the next. However, of the nine attendance variables only voluntary frequency was reliably predicted by differences between ZIP Code groups. This analysis may have been overly conservative because there were a relatively large number of reported ZIP Codes (24), some of which only had one miner but all of which substantially limited the power of the statistical tests.

Miners were also asked how many of their absences were caused by transportation problems. Since the available responses were a fixed-choice set of relative amounts ("all," "most," "some," or "none"), it was not really valid to use their answers as a measure of absolute levels of the transportation problems variable.

Age and Illness

Miners' age was significantly correlated only with involuntary absences, and then only with the total and severity indices (not with frequency). This makes sense in light of our use of the age variable as a surrogate for miners' health status: We expected less healthy miners to have more lengthy ("severe") absences than their healthy counterparts, but that their frequency of absence incidents would not necessarily differ from that of healthier miners.

Safety

Safety was not directly measured in this study, so the miners' working areas were used as a surrogate variable that would reflect different levels of hazard exposure. The miners in this study worked in two producing sections and a third group worked in the outby areas. In comparing the miners in the two producing sections, no significant differences in absence rates were found. Because the types of tasks performed by miners in outby areas are substantially different than the tasks performed by those who work in producing sections, it is not considered appropriate to compare them to miners in the two producing sections. Any differences in absence rates between outby workers and workers at the face could be attributed to many factors other than differences in the safety of their work environment.

It is recommended that future studies use a more direct measure of safety. Accident rates or observation of hazards are common measures, but they were beyond the scope of the current study.

Attendance Motivation

Attendance motivation was indirectly operationalized as a function of its precursor variables. Therefore, the discussion of findings for these variables will examine their relationships with the nine absenteeism variables.

Overall Job Satisfaction

It was hypothesized that overall job satisfaction would have, at best, only a minor effect on attendance. As it turned out, though, overall satisfaction had a significant negative correlation with both the total number of voluntary absences ($r = -0.23$, $p = 0.034$) and the frequency of involuntary absences ($r = -0.37$, $p = 0.002$) absences. Working backward, we expected that overall satisfaction would depend on miners' levels of satisfaction with several specific aspects of their jobs. To test this hypothesis, an ordinary least squares linear regression was performed, using the specific satisfaction variables to predict variance in overall satisfaction. While the derived model accounted for a reasonable 33 pct of the variance, this did not quite reach conventional levels of significance ($F = 2.00$, $p = 0.07$). The relationships of specific satisfaction variables with overall satisfaction will be discussed below.

Satisfaction With Safety

Actual job safety and miners' fears of underground hazards were hypothesized to affect their satisfaction with the safety of their jobs. The fear variable was not measured, and only a surrogate was available to assess actual safety: the section (work area) variable discussed before as a determinant of perceived ability to attend. A one-way analysis of variance, however, revealed no differences between sections in their levels of satisfaction with safety. This is consistent with our earlier interpretation that there were probably no real differences in safety between the sections.

Hence, for the subject mine, section is probably not a useful surrogate for safety. Satisfaction with safety did, however, significantly correlate with both overall satisfaction and the number of voluntary absences.

Satisfaction With Coworkers

Miners' satisfaction with the other members of their crew was not significantly related to either overall satisfaction or any of the absenteeism indices. It is important to note here that the variance on this measure was extremely low. Almost all (98 pct) of the miners reported that they were either satisfied or very satisfied with their coworkers.

Satisfaction With Equipment

There was more variance on this variable than on most of the other measures of satisfaction. Consequently, it had a greater opportunity to explain variance in the criteria variables. However, it was not significantly related to overall satisfaction and significantly predicted only the frequency of semivoluntary absences.

Satisfaction With Opportunities For Family-Social Activities

This variable was found to have a significant positive relationship to overall satisfaction and was negatively associated with the absenteeism index of semivoluntary severity. As predicted, it varied significantly as a function of shift; night shift miners reported the lowest levels of satisfaction (one-way analysis of variance, $F = 3.69$, $p = 0.03$), while day and evening shift miners reported almost identical satisfaction levels.

Satisfaction With Conditions of Work

The two measures of this variable were not significantly related to overall satisfaction, but they both had significant negative correlations with the total and frequency indices of semivoluntary absences. Semivoluntary absences tend to be the most costly to the miner because they are unpaid and can result in disciplinary action. It seems reasonable that feelings that work is unpleasant would drive miners to take more of these costly absences.

Satisfaction With Job Content

This variable had small, but significant, correlations with overall satisfaction. However, it was not significantly related to any of the absenteeism measures.

Satisfaction With Supervision

This variable did not significantly correlate with overall satisfaction, but it was negatively related to the severity of voluntary absences and positively related to voluntary absence frequency. The strongest relationship here is the negative correlation with severity ($r = -0.34$), which indicates that the weaker correlation to frequency is probably an artifact of the inverse mathematical relationship between the two indices.

Satisfaction With Career Advancement Opportunities

Although miners' satisfaction with advancement opportunities was not related to overall satisfaction, it was negatively correlated with the total and frequency indices of involuntary absences as well as with the severity of semivoluntary absences. Since promotions could be contingent upon good attendance, the direction of causality in these relationships is not clear.

Job Involvement

This variable was not measured, so its components (satisfaction with advancement opportunities, job content, and supervision) will be used in its place in the overall model.

Distributive Justice

Distributive justice usually refers to pay equity and the fairness of other non-economic reward systems. We used miners' opinions of the fairness of the mine's absence categorization process as a partial and imperfect measure of this construct. This variable had a highly significant positive relationship to the frequency of involuntary absences. The hypothesized determinants of distributive justice (satisfaction with pay and supervision) were entered in a regression equation to assess their impact. However, the 35 pct of variance in the criterion variable predicted by this model was not significant ($F = 2.48$, $p = 0.07$).

Absence Control System Permissiveness

A Guttman scale variable was constructed on the basis of four questions that assessed miners' opinions of whether a hypothetical absence would be excused under different circumstances. The direness of the excuses for absence decreased from the first question to the last, so miners who said that they would be excused on the fourth question received the highest lenience score, while miners who said that they would not be excused under any of the described conditions received the lowest score.

Scores on the lenience scale correlated significantly with only the involuntary frequency index. The relationship between the four questions that comprised the lenience variable and the nine absenteeism variables was examined in detail to determine whether a relationship existed that was examined in detail to determine whether a relationship existed that was missed by the summary variable. Thirty-six one-way analyses of variance (four questions by nine absence measures) turned up only three significant relationships. Miners who felt that they would not be excused for an illness without a written excuse from a doctor had involuntary absences 9 pct of the time, while other miners who thought they would be excused under the same circumstances had an average involuntary absence index of only 3 pct. One way to interpret this finding is that miners who took more "sick days" (the main type of involuntary absence) would be more likely to have difficulty getting additional illnesses excused. A question about the mine's permissiveness for absences due to personal reasons showed that miners had slightly but significantly more frequent involuntary absences if they felt they would not be excused for these absences. Again, it is possible that the causal direction is the reverse of that indicated in the model: Miners' absence history can affect their expectations of how they will be treated in the future. These results should be taken with a grain of salt, however. One or two of the 36 analyses of variance could be expected to be significant just by chance even if no real relationship existed.

Desire To Avoid Loss of Income

Local Unemployment Rate

Since this was a one-mine study, no real variation existed in local unemployment rate. This variable is still considered important to the model, but it was not measured in the current study.

Kinship Responsibility

Miners were hypothesized to have stronger kinship responsibilities as the number of dependents they had increased. However, this variable did not have a significant impact on measured absenteeism.

Attendance Norms

Norm-based sanctions were hypothesized to affect attendance behavior. Miners who felt that criticism from their families would result from their absences had significantly less frequent involuntary absence and lower severity semi-voluntary absences. Norm sanctions from coworkers and foremen appeared to be less influential than family norms since neither of these questions significantly correlated with absenteeism.

Personal Values

Miners' beliefs about work ethic concepts were not measured. Usually, personal values are culturally based, and the culture in this one-mine study was expected to be too homogeneous to result in useful variance in work values.

ENTIRE MULTIVARIATE ABSENTEEISM MODEL

The relationships represented in the entire model depicted in figure 1 were tested by performing a series of large multiple linear regressions of all predictive variables on the nine absenteeism indices. If a summarizing construct was measured (e.g., overall satisfaction), the percursor variables (satisfaction with safety, satisfaction with coworkers, etc.) for that construct were not included in the analysis. Consequently, the regressions consisted of 16 independent variables. Because of missing values, only 33 cases were complete enough for the analyses. This, combined with the relatively large number of variables, reduced the power of the analysis to detect meaningful differences. That is, the effects of the variables would have to be relatively large and free of "noise" to result in significantly large regression statistics. Attempts to increase the statistical power of the analysis by selectively dropping variables did not substantially improve the level of significance, so the entire model was retained. The entire regression model is listed below:

Absenteeism = distance to mine + age + section 1 dummy + section 2 dummy + S/W (Satisfaction with) opportunities for social activities + overall job satisfaction + S/W advancement opportunities + S/W Job content + S/W supervision + S/W pay + S/W fringe benefits + S/W supervision fairness + control system permissiveness + desire to avoid income loss + family norms + crew norms.

As can be seen from table 5, the regression equations did explain a sizable amount of variance in absenteeism with explained variance (regression R^2) ranging from 0.44 to 0.79. However, only one of the nine regressions reached the conventional 0.05 level of statistical significance. The largest proportion of explained variance was obtained for the regression on voluntary absence severity ($p=0.007$). Particularly influential independent variables in this model were satisfaction with pay and satisfaction with supervision (both surrogates for distributive justice). Three other models had high levels of explained variance that approached, but did not attain, statistical significance.

DISCUSSION

The overall empirical support for the model proposed in this study is not overly impressive. However, the failure to find empirical support for many of the hypothesized relationships between variables does not necessarily mean that the relationships do not exist. There are many reasons (discussed later in this section) why the present study could have failed to find empirical support for hypothesized relationships that do, in fact, exist. However, the converse is not true. If no relationship actually exists, it is unlikely that the present study would have come up with empirical evidence that suggests that it does. Therefore, the fact that some of the variables were found to be statistically significant predictors of absenteeism is quite noteworthy. The implications of two such findings are discussed below.

The regressions that tested the ability of the overall model to predict absence rates are the most informative. Recall that the overall model used to predict voluntary absence severity was statistically significant. Also recall that the variables satisfaction with pay and satisfaction with supervision were negatively related to the absenteeism index for the severity of voluntary absences, and that this index refers to the length of absences concerning which miners have the greatest discretion--the time allowed

TABLE 5. - Regression models of nine absenteeism variables

Independent variables	Totals			Frequency			Severity		
	V	SV	IV	V	SV	IV	V	SV	IV
Age	-0.40	-0.27	0.42	-0.39	-0.27	0.27	0.13	-0.11	0.26
Control system permissiveness	.10	.10	-.15	.19	.12	-.37	-.05	.00	-.06
Desire to avoid income loss	-.19	-.02	-.05	-.08	-.06	.11	-.08	.37	-.07
Distance to mine	.10	.12	-.07	.17	.13	-.45	-.11	-.18	.01
Management fairness	-.27	-.27	-.05	-.21	-.21	.16	.03	-.15	-.15
Attendance norms:									
Crew	.19	.47	-.14	.14	.40	.07	.04	-.04	-.04
Family	-.19	-.55	.07	-.15	-.52	-.45	.07	-.39	.15
Satisfaction with--									
Opportunities for social activities	.34	.02	-.06	.35	.02	-.15	.11	-.21	.03
Advancement opportunities	.03	-.08	-.41	.20	-.13	-.30	-.18	-.38	-.43
Job content	-.36	.30	.06	-.33	.32	-.06	-.14	.19	.08
Supervision	.32	.04	-.14	.53	.03	.16	-.77	.15	-.19
Pay	.23	.18	-.42	.35	.17	.08	-.31	.07	-.56
Fringe benefits	-.29	.03	.03	-.21	.02	-.11	-.05	-.22	.05
Overall satisfaction	-.19	-.47	-.18	-.25	-.46	.05	.22	-.18	-.19
Section dummy variables:									
1	.47	-.49	.17	.32	-.52	-.32	.38	-.77	.28
2	.22	-.29	-.10	.22	-.29	.10	.04	-.55	.02
Variance explained (R^2)	.53	.48	.56	[1].70	.44	.53	[2].79	[1].67	[1].70

V Voluntary absence. SV Semivoluntary absence. IV Involuntary absence.
[1]$p < 0.09$. [2]$p < 0.01$.

for vacations and personal days. This means that, when they had a choice, miners who were less satisfied with their pay and their supervision were inclined to stay away from work longer than those who were more satisfied with their pay and supervision.

These findings suggest that miners' perceptions about the inequity of the exchange relationship they have with their employer are an important determinant of absence severity. Inequity theory states that employees' judgments about the fairness of their employer-employee relationship are largely determined by (1) the perceived adequacy of the economic rewards (pay) they receive and (2) the degree to which their supervisor is perceived to be fair. Employees may view their supervisor as unfair because the supervisor makes unreasonable demands, does not give them the recognition they deserve, is too critical, or takes advantage of them in some way. Inequity theory states that feelings of inequity are aversive, and people tend to avoid participating in exchanges that cause such feelings. Under conditions of high unemployment, miners may not be able to totally withdraw from the exchange, i.e., quit. Under such conditions, the only viable strategy for reducing inequity may be to stay away from work whenever possible.

In summary, the statistically significant findings from this study appear to be in line with the predictions of the model that were derived from inequity theory. This study found that miners who are dissatisfied with their pay and/or their supervisor tend to be absent for relatively long spells. These long spells of absence may stem from a reluctance to resume participating in an exchange that, because it is perceived as unfair, tends to cause feelings of anger and frustration. When employees who hold such views are away from work, they may

experience temporary relief from these noxious feelings. Because returning to work is associated with an intensification of these unpleasant feelings, these employees may tend to stay away from work for relatively long periods.

The explanation offered above regarding dissatisfaction with one's supervisor assumes that employees' absences are prompted by unfair treatment. However, an alternative explanation for the observed relationship is that employees who are absent for relatively long spells prompt their supervisors to do things that result in feelings of unfair treatment. Given the design used in this study, it is not possible to rule out this alternative explanation. However, based on prior research, the model assumes that the predominant direction of causality is

perceived unfair treatment ⟶ absences.

Limitations.--It is impossible to perform a completely accurate and comprehensive test of a model in any one study. As in all studies, the methods used to test the model proposed in this study had certain limitations. First, it was not feasible to test all aspects of this model. Some variables were not measured at all, i.e., overall attendance motivation, perceived ability to attend, job involvement, distributive justice, and personal work ethic. There is good reason to expect that these variables have an important influence on miners' attendance. However, given various limitations such as the amount of time that could be spent in interviewing each miner, it was impossible to collect all of the information needed to test the entire model. It is strongly recommended that the impact of these variables be assessed in future studies of miners' attendance.

Certain variables in the model can be assessed only in studies that involve a number of different mines. The present study looked at only one mine. Therefore, it was not possible to test the impact that differences in absenteeism control system permissiveness or local job opportunities have on absenteeism. Such variables cannot be tested in studies of a single mine because, for the miners who work at a single mine site, there are no substantial differences in these variables. Nevertheless, several studies suggest that such variables are important determinants of absenteeism.

The way that the variables in the model were operationalized for this study represents only one of several approaches. One reason for failing to observe significant relationships between variables (in this or any study) is that the variables were not operationalized in a way that adequately reflects the concept that one hoped to measure. It is always possible that certain variables were not operationalized adequately, and that if they had been operationalized in a better way, the data would have supported the model's predictions.

Some variables were assessed using surrogate measures--ones thought to be highly correlated with the variable of primary interest. For example, age was used as a surrogate for the individual's health status. Although surrogates provide a useful means for testing hypothesized relationships, they are valid only to the extent that they actually do correlate well with the variable of primary interest. The surrogate variables used in this study were selected to be the best available correlates of the missing variables as well as being relatively unconfounded by other influential variables.

Another limitation to the present study's test of the proposed model stems from the poor economic conditions that existed in the mining industry at the time this study was conducted. As previously discussed, various studies have indicated that absenteeism levels are usually significantly lower during times of high unemployment. The fact that a major layoff occurred at the mine just prior to the period during which data were collected for this study suggests that the levels of absenteeism observed were somewhat lower than usual, and that the overall amount of variation in levels of absenteeism between miners in this study was less than usual.

This has important implications for the tests that were performed. The general

approach to empirically demonstrating that two variables are related to one another is to show that variations in one variable are useful for making predictions about the other variable--useful in the sense that the predictions are more accurate than random guessing. Given the nature of the mathematics involved, it is relatively difficult to demonstrate that a "statistically significant" relationship exists between any two variables if one observes very little variation in one or both of the variables.

Because the amount of variation between miners' levels of absenteeism was probably lower than usual, the present study's tests of the proposed relationships between variables in the model are on the conservative side. If the study had been performed when the economy was better and there were greater variations in miners' absenteeism rates, one would have been more apt to find statistically significant relationships between the variables in the model.

One must be cautious about generalizing these findings to other mines. In judging how safe it is to assume that the findings from this study are applicable to other mines, one should be especially careful to take note of differences in local unemployment levels, absence control policy, and cultural influences. One should keep in mind that the less similar other mines are to the one examined for this study, the less confident one can be that the same relationships hold true.

This report has attempted to summarize what is known about the causes of miners' absenteeism and has not attempted to provide the mining industry with advice on how to achieve low levels of absenteeism. The production of a report addressing this issue is currently underway.

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APPENDIX.--INTERVIEW GUIDE FOR MINERS

February 19, 1986

Name of Interviewer_____

Name of Interviewee_____

Date_____ Shift: Day_____ Eve._____

Mine Section_____

Robert Peters and Robert Randolph
U.S. Bureau of Mines
Pittsburgh Research Center
Pittsburgh, PA 15236

INTRODUCTION TO QUESTIONNAIRE

Hello, my name is _____. I'm part of the group from the Bureau of Mines in Pittsburgh that is spending a few days at the xxxx mine interviewing miners. You may have already heard about us from the letter that has been posted at xxxxxx during the past week. Briefly what it said is that both the union and management has given us permission to talk with you.

One of the main reasons the Bureau of Mines is doing this study is to find out more about why miners are sometimes absent from work. Miners who must temporarily fill in for the regular members of an underground mining crew are sometimes unfamiliar with the physical conditions of the crew's section and the habits of the people who work in the crew. Because temporary replacements are not as familiar with the crew and the section, they sometimes either do things or fail to do things that can reduce productivity and contribute to accidents. Therefore, the Bureau of Mines is trying to find out more about why miners are absent, and what can be done to keep attendance at a high level.

During this interview, I'm going to ask for your opinions about the reasons miners are sometimes absent, your feelings about your work, and what you think influences safety and productivity at this mine. Most of the questions will probably be quite easy to answer, although a few may be more difficult.

Your participation is completely voluntary. You need not answer every question. Anything that you do tell us will be held in strict confidence. By that I mean that neither the company nor the union can have this interview, and nothing that you say will be identified with you. We will only provide back summary information. For example, we might report that 70% of the miners believe that their boss treats them fairly.

We have conducted interviews with miners before and found that most enjoy talking about their work. Sometimes their ideas led to improvements at the work site.

At this point, do you have any questions?

1. JOB HISTORY

I'd like to start by getting some information about your experience as a miner.

1.1. What is your present job? _____

1.2. How long have you been on that job? _____

1.3. Is that the job you are doing today? Yes _____ No _____
(Probe: If "No" ask, "What job are you doing today?")

1.4. How long have you worked at this mine? _____

1.5. Altogether, how many years have you worked as a coal miner? _____ years

2. WORK SATISFACTION

My next set of questions concerns how satisfied you are with various aspects of your job. What I will do is read you a set of statements. For each statement, I want you to tell me how satisfied or dissatisfied you are.

How satisfied or dissatisfied are you with:

2.1. _____ The amount of pay you get.

2.2. _____ The fringe benefits you receive.

2.3. _____ The amount of job security that you now have.

2.4. _____ The quality of the equipment you work with.

2.5. Is there some other job at this mine that you would rather have than your present one?

_____ Yes _____ No [Go to 2.7]

2.6. _____ If yes, how satisfied are you with your chances of getting that job during the next 6-12 months?

2.7. _____ The training you received for your present job.

2.8. _____ Your present boss.

2.9. _____ The bath house, parking area, and other facilities aboveground.

2.10. _____ The physical conditions below ground (e.g., top and bottom, water, eating areas).

2.11. _____ (If miner presently holds a temporary job), how satisfied are you with your job as a _____?

2.12. _____ Your work as a _____ (regular job).

2.13. _____ The other members of your crew.

2.14. _____ The safety of working at this mine.

2.15. _____ The amount of time you have to spend with your family and friends.

2.16. _____ Overall, putting everything we've talked about together, how satisfied are you working here?

2.17. Is there anything that could be done to make working here more satisfying?

3. PROBABILITY OF BEING LAID OFF

As you probably know, miners are sometimes laid off for a variety of reasons--particularly when there is a drop in the demand for coal. In the next few questions, I am going to ask you about layoffs at this mine.

3.1. Do you think any miners at this mine will be laid off (not fired) within the next year?

_____ Yes _____ No (skip to amount of search)

3.2. How likely is it that <u>you</u> will be one of the miners laid off in the next year?

4. AMOUNT OF SEARCH

4.1. Have you thought about finding a different job away from this mine?

_____ Yes _____ No

4.2. Have you spent any time looking for another job in the past year?

_____ Yes _____ No

5. JOB OPPORTUNITIES

5.1. If you had to find another job (perhaps because of a layoff) how long do you think it would take?

_____ days

6. ABSENTEEISM QUESTIONS

6.1. Some people say they need 5 days' pay a week in order to get by. Some need 5 days plus overtime. Others claim they could make it on 3 or 4 days' pay. Do you need:

5 days 5 days plus overtime Could make it on 3 or 4 days

6.2. MINERS' OWN PAST ABSENCES

6.2.1. Think back to the last day you missed work for any reason. About how long ago was that?

_____

6.2.2. Why did you take that day off?

6.2.3. When did you decide when you were going to take that day off?

On that day The day or so before More than a couple of days before

6.2.4. Was it unusual for you to miss work because of _____ (reason)?

_____ Yes _____No (skip to next question)

In what way was it unusual?

6.2.5. You said that you were absent because of _____. How much control did you have over the things that caused you to be absent?

6.2.6. Under the current contract, there are nine personal days and floating days that can be taken off. Some people take all of those days off, others take only some of those days off, and others take off none of those days. In this year, are you going to take all of them, some of them, or none of them off? (Circle one)

All Some None

The next set of questions concerns various reasons why a miner might be absent from work. What I'd like you to do is consider all of the times you were absent over the past year or two.

For example, let us consider accidents, either on or off the job. If you had no absences during the last year or two due to an accident, then you should indicate "4, not an important" cause.

On the other hand, it's possible that virtually all of your absences during the past year or two were caused by accidents. If that were the case, then you should indicate "1, a very important" cause.

The answers "important," and "slightly important" should be used to indicate in-between levels.

6.2.7. _____ Accident, either on or off the job

6.2.8. _____ Personal illness

6.2.9. _____ Family illness

6.2.10. _____ Legal or financial problems that need to be resolved during working hours.

6.2.11. _____ Too hungover to work

6.2.12. _____ Transportation problems

O.K. we've got about 6 more to do.

6.2.13. _____ Family or marital problems

6.2.14. _____ Problems with your house or property

6.2.15. _____ Wanting to go hunting or fishing

6.2.16. _____ Being with your family

6.2.17. _____ Just being by yourself for a day

6.2.18. _____ Working on a hobby

If you were absent more days than the contract allows, how likely is it that you would:

6.2.19. _____ be criticized by your family

6.2.20. _____ be criticized by your crew

6.2.21. _____ be criticized by your boss

6.2.22. Thinking about all of the reasons why you have been absent, how much control do you have over whether you are absent or not?

6.3. MINERS' OWN FUTURE AND HYPOTHETICAL ABSENCES

6.3.1. Let's assume that you used up all your contract days and then took off because <u>you were ill</u>. If you did not have a doctor's slip, is it likely that the company

a. _____ would excuse you?

b. _____ would not excuse you?

(If response is "it depends," check here _____ and ask, "you said it depends...on what does it depend?")

6.3.2. Let's assume that you used up all your contract days and then took off because of an illness in your family. If you did not have a doctor's slip or a hospital excuse, is it likely that the company

a. _____ would excuse you?

b. _____ would not excuse you?

(If response is "it depends," check here _____ and ask, "you said it depends...on what does it depend?")

6.3.3. Let's assume that you used up all your contract days and then took off because of personal business, e.g., your furnace broke down or you had to go to the bank. If you notified them in advance, is it likely that the company

a. _____ would excuse you?

b. _____ would not excuse you?

(If response is "it depends," check here _____ and ask, "you said it depends...on what does it depend?")

6.3.4. If you did not notify them in advance, is it likely that the company

a. _____ would excuse you?

b. _____ would not excuse you?

(If response is "it depends," check here _____ and ask, "you said it depends...on what does it depend?")

6.3.5. How fair do you think the company is when they decide whether an absence is excused or not excused?

6.4. OTHER MINERS' ABSENCES

I'm going to ask a set of questions concerning various reasons why a miner might be absent from work. What I'd like you to do this time is consider all of the times you can remember when other miners at this mine were absent over the past year or two.

We'll be using the importance card again, so the instructions are the same.

6.4.1. _____ Accident, either on or off the job

6.4.2. _____ Personal illness

6.4.3. _____ Family illness

6.4.4. _____ Legal or financial problems that need to be resolved during working hours.

6.4.5. _____ Too hungover to work

6.4.6. _____ Transportation problems

O.K. we've got about 6 more to do.

6.4.7. _____ Family or marital problems

6.4.8. _____ Problems with their house or property

6.4.9. _____ Wanting to go hunting or fishing

6.4.10. _____ Being with their families

6.4.11. _____ Just being by themselves for a day

6.4.12. _____ Working on a hobby

6.4.13. Thinking about all of the reasons why other miners here have been absent, how much control do they have over whether they are absent or not?

7. ACCIDENTS AND SAFETY

The next few questions are about safety and accidents at this mine. I'm going to read a list of statements about the reasons for accidents that cause people to be injured at the xxxxx mine. Using this response card, I'd like you to rate how important each of these reasons is for explaining why miners suffer injuries.

How important is _____ as a contributor to mining accidents?

7.1. _____ faulty or poorly maintained equipment.

7.2. _____ poorly maintained roof conditions.

7.3. _____ foremen's lack of interest in safety.

7.4. _____ the fact that some miners may fail to realize that certain things they do are dangerous.

7.5. _____ the fact that some miners may not know how to take care of unsafe conditions.

7.6. _____ horseplay and showing off.

7.7. _____ unavoidable "Acts of God or nature."

7.8. _____ the fact that some miners may be so worried about their personal problems that they don't concentrate on what they are doing.

7.9. _____ the excessive use of drugs or alcohol.

7.10. _____ the fact that miners sometimes try to save time by taking shortcuts that could be dangerous.

7.11. In any mine, and particularly this one, we would like to improve safety by reducing accidents. Let's assume when you come to work tomorrow that you have all the money and authority you need. What would you do to improve safety at this mine?

8. MAJOR PROBLEMS

I'm going to read a list of things that are major problems at some mines, but not at others. I'd like you to tell me the extent to which you agree or disagree that each item is a major problem at this mine.

8.1. _____ bad roof conditions

8.2. _____ lack of cooperation between crews

8.3. _____ too much absenteeism

8.4. _____ too many accidents

8.5. _____ poor relations between labor and management

8.6. _____ poor equipment

8.7. _____ too much down time

8.8. Are there any other major problems at this mine?

8.9. What is the most serious problem this mine faces?

8.10. I think it's fair to say that the costs of producing a ton of coal are increasing. The cost gets passed on in our electric bills. Let's assume when you come to work tomorrow you have all the money and authority you need. What would you do to reduce the costs of producing coal from this mine?

8.11. What would you do to increase productivity?

8.12. What would you do to reduce absenteeism?

8.13. Do you think that any changes should be made at this mine?

9. BACKGROUND INFORMATION

We've talked a lot about your work. Now I'd like to finish up by asking you a few questions about yourself.

9.1. How old are you? _____ years

9.2. Are you married? _____ Yes _____ No

9.3. How many people (not including yourself) are dependent on you for support?

_____ dependents

9.4. About how many miles is it from your home to the mine?

_____ miles

Finally, do you have any objection to our obtaining additional data about you from company personnel files?

_____ I have no objections.

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